MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

EME3186 - ERGONOMICS AND HUMAN FACTORS

(ME)

11 AUGUST 2022
9.00 A.M. – 11.00 A.M.
(2 Hours)

INSTRUCTION TO STUDENTS

1. This Question paper consists of 6 (SIX) pages including the cover page.

2. There are 4 (FOUR) Questions in this Exam paper. Attempt ALL questions.

3. All questions carry equal marks and the distribution of marks for each question is given in the question paper.

4. Write all your answers in the Answer Booklet provided

QUESTION 1

a) **Figure Q1(a)** shows the various movements of a human body during load lifting. Find the torque generated at L5. **[3 marks]**

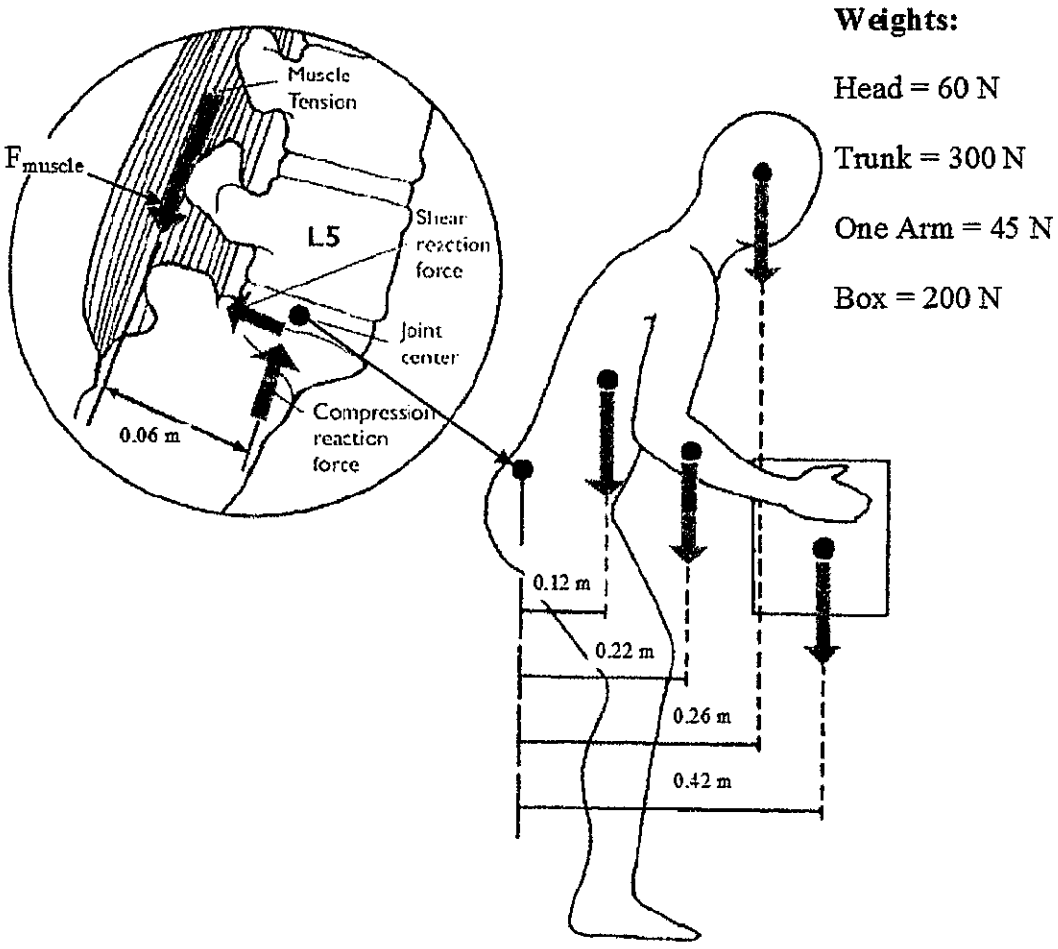

Figure Q1(a)

b) Based on your answer in part 1(a), find the equivalent force acting on the muscle of the spine, F_{muscle}. **[3 marks]**

c) Propose a way to reduce the force on the muscle (F_{muscle}) during the lifting process assuming the weights are kept constant? **[3 marks]**

Continued...

d) **Figure Q1(d)** illustrates an example of the spine disorder due to improper support to the lumbar region. In the light of your ergonomic knowledge, how would you design a car seat to suit a person with such disorder?
(*Note: Only provide ONE design consideration either in brief words or by means of a neat sketch*) **[3 marks]**

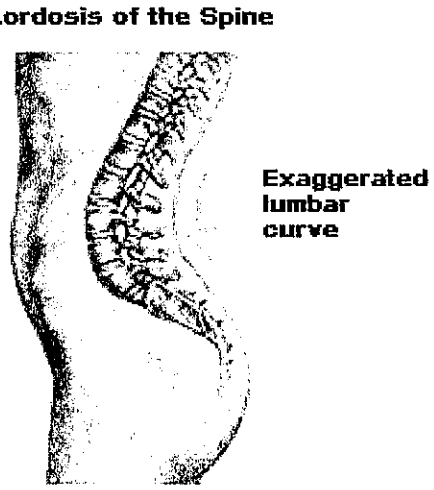

Figure Q1(d)

e) By means of a simple sketch, design a workstation that accommodates the toe space for an operator who is performing a sitting job operation.
[3 marks]

f) **Figure Q1(f)** shows a trenching vehicle and its control cabin. By analyzing the figure, propose **FIVE** ways on how can you improve the control panel design and the operator's work posture.
(*Note: You may support your answer with neat drawings and sketches*)
[10 Marks]

Continued...

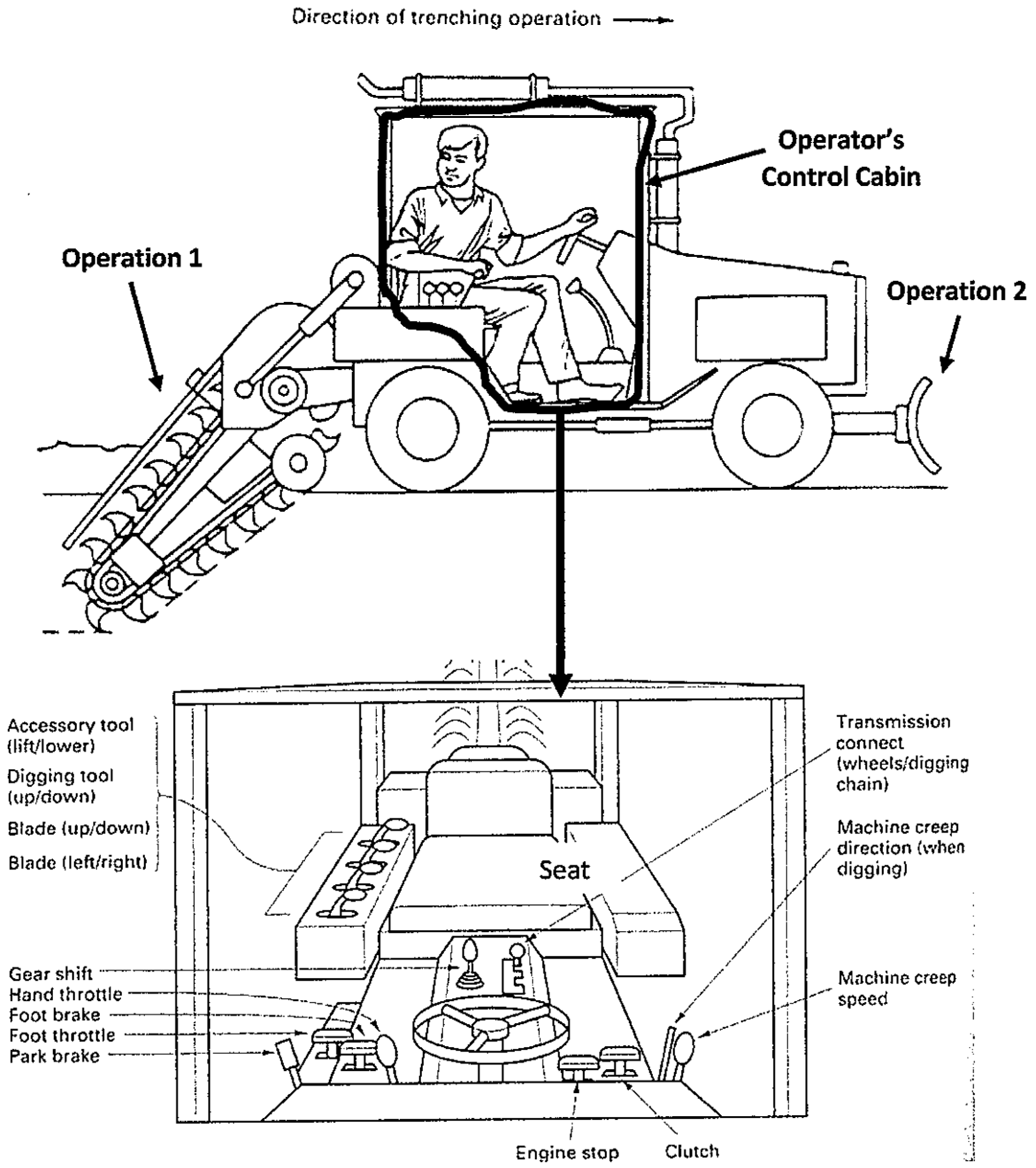

Figure Q1(f)

Continued...

QUESTION 2

a) Design a computer workstation based on the nature of the task given as below:
   i) Operator performs computer works **[3 marks]**
   ii) Operator works namely with supporting documents **[3 marks]**
   iii) Operator performs mixed activity with the computer and documents with frequent phone calls. **[3 marks]**
   iv) Operator heavily prints documents after typing a given report using a computer. **[3 marks]**

b) Draw on a x-y-axis the different types of office concepts based on humans 'Interaction vs. Autonomy'. **[10 marks]**

c) Based on your answer in Q2 part (b), which setup will you proposed for an independent mother whom is actively working at the stock market and at the same time frequently breast feed her child. **[3 marks]**

Continued...

QUESTION 3

a) Design an ergonomic workstation that incorporates '*neutral postures*'. You may assume the person is sitting while using the computer to carry out a specific task.

[10 marks]

b) One of the main challenges automakers face in the automotive industry is on the ergonomic design for foot operations. Using your ergonomic knowledge, design an ergonomic pedal accelerator of a car. Propose **FIVE** ergonomic design features of your ergonomic pedal accelerator.

[12 marks]

c) Construct a diagram with correct labelling showing the main elements of '*fitting a person to a job vs. fitting the job to a person*'.

[3 marks]

QUESTION 4

a) Draw and label the **FIVE** types of 'Luminaire'.

[15 marks]

b) Based on your answer in Q4 part (a), give one example each on the 'Luminaire' used.
(Note: You are supposed to give FIVE applications for the FIVE different Luminaire given in Q4 part a)

[10 marks]

End of Paper